

①

* Domain of f_n of several variables:-

- 1 - Limits
- 3 - Taylor and Maclaurine Series.
- 4 - Integration line / double / Triple.
- 2 - partial derivatives:

$$Z = f(x, y) = f_n(x, y)$$

2D

$$y = x^2 + 2x + 13$$

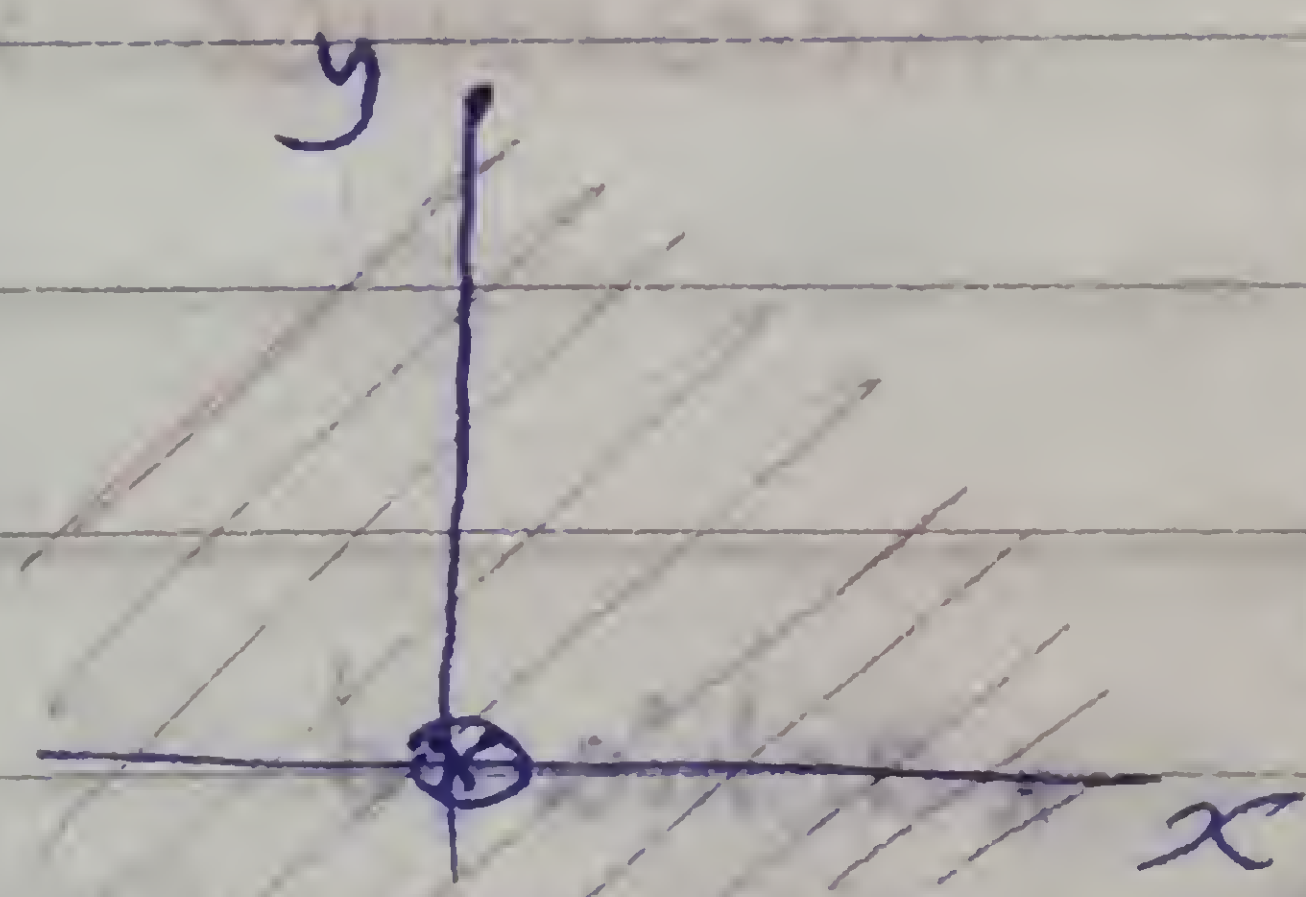
$$D_f = \mathbb{R}$$

3D

Polynomials

$$Z = x^2 y + 2 y^2 x^3$$

$$D_f = \mathbb{R}^2 \text{ or } \{(x, y) : x \in \mathbb{R}, y \in \mathbb{R}\}$$



$$y = \frac{1}{x}$$

$$D_f = \mathbb{R} - \left\{ \frac{1}{x} \right\}$$

Rational

$$D_f = \{(x, y) \in \mathbb{R}^2 - \left\{ \frac{1}{x} \right\}\}$$

$$y = \tan x$$

$$D_f = \mathbb{R} - \left\{ \pm \frac{(2n-1)\pi}{2} \right\}$$

$$D_f = \{(x, y) \in \mathbb{R}^2 - \left\{ \sin^{-1}(xy) \right\}\}$$

$$\sin^{-1}(xy)$$

$$1 > xy > -1$$

ex: Find D_f and sketch.

① $f(x, y) = \frac{1}{x^2 + y^2 - 16}$

sol

$$D_f = \{(x, y) \in \mathbb{R}^2 - (x^2 + y^2 - 16 = 0)\}$$

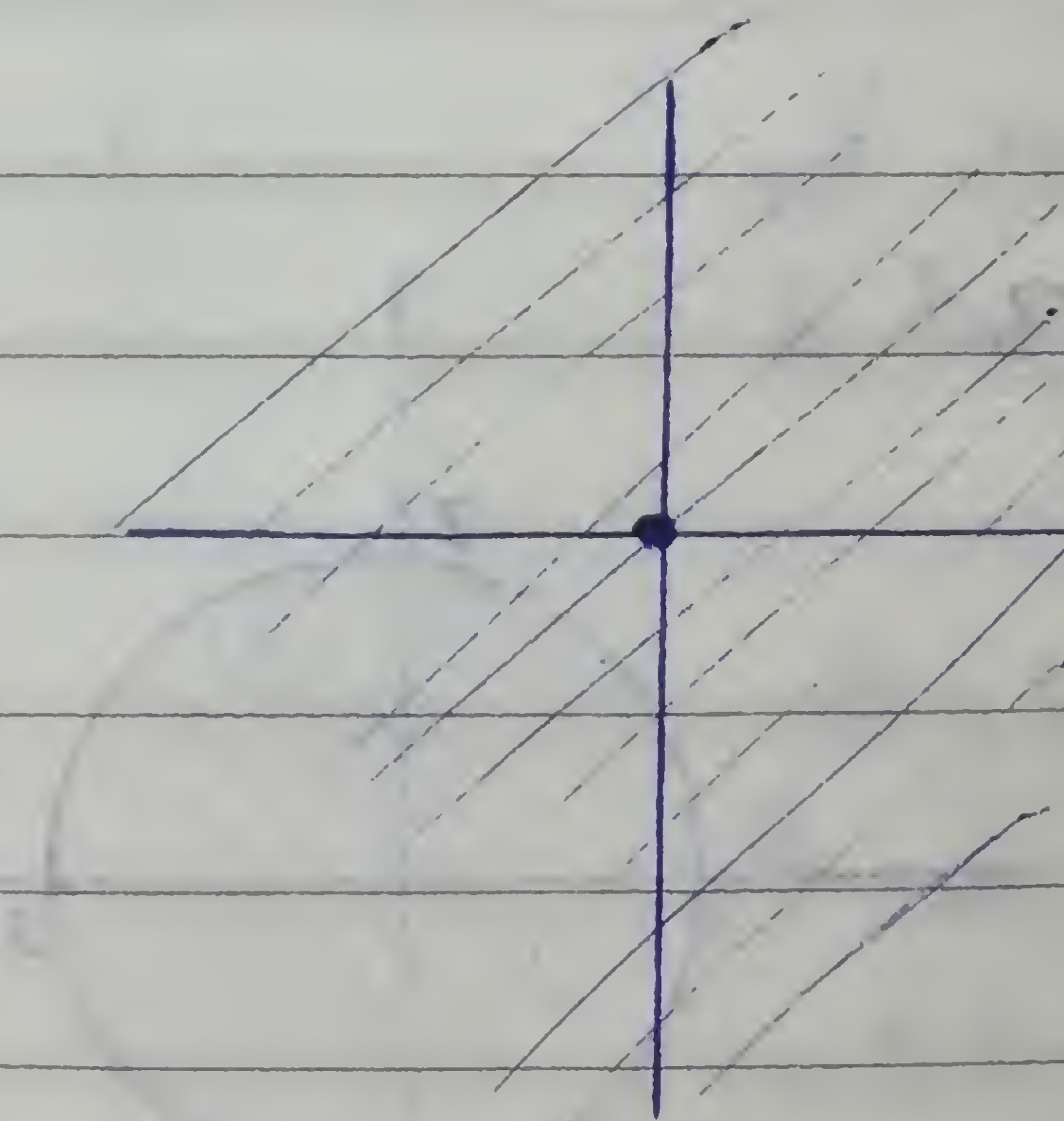
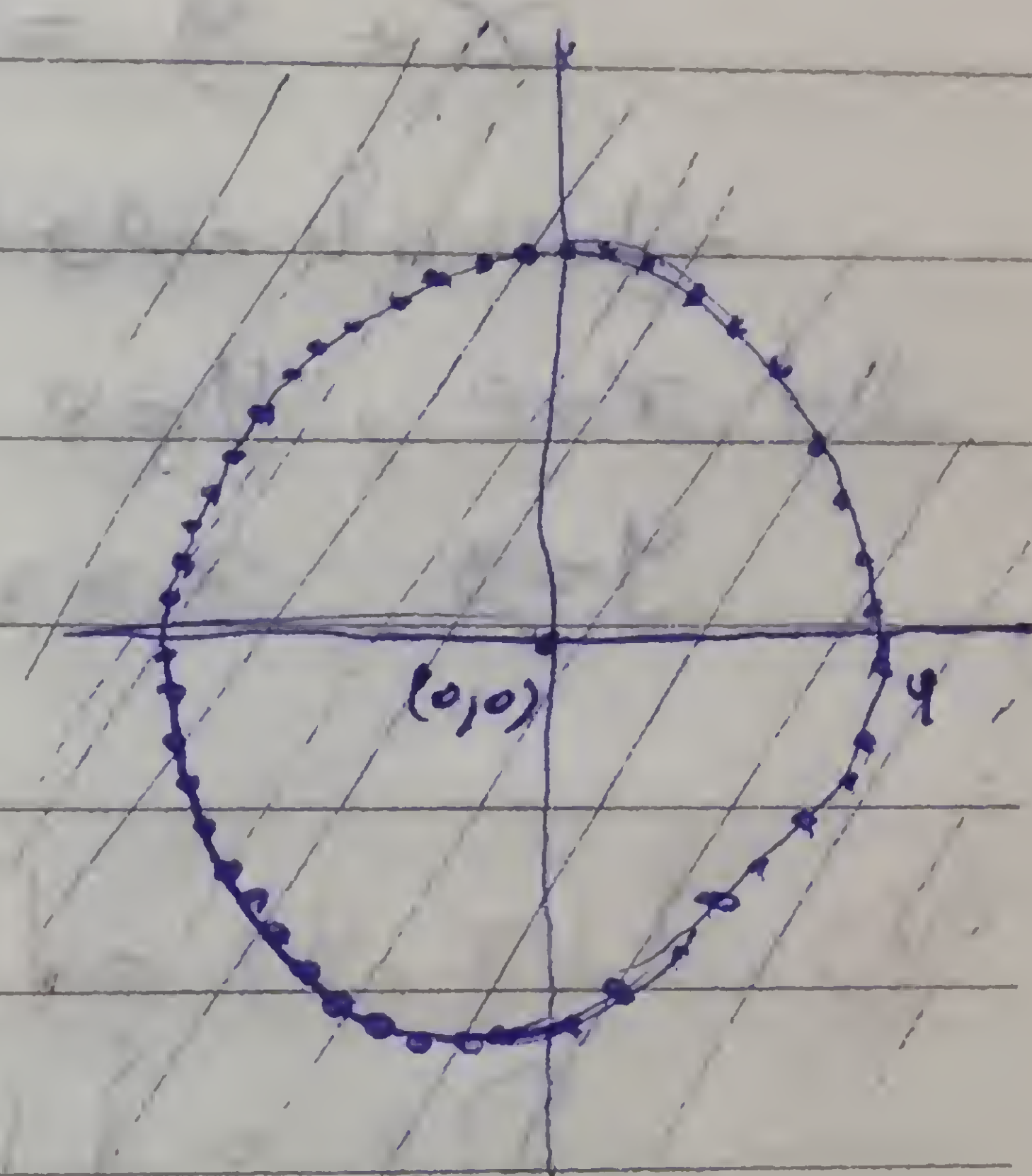
$$x^2 + y^2 - 16 = 0$$

$$x^2 + y^2 = 4^2$$

② $f(x, y) = \frac{x+y}{x^2+y^2}$

$$D_f = \{(x, y) \in \mathbb{R}^2 - (x^2 + y^2 = 0)\}$$

$$x^2 + y^2 = 0$$



نصف أي نقطة على
المعيط ولو نفقت في المارة
نحلها ~~بالمعيط~~ (معركة)
ولو اعطاني دالة
غير معرفة نحلها
منقطة انتم نصف نقطة
بوجه الازمة ونحو
الدالة معرفة ولا لا.

3) $f(x, y) = \sqrt{x+y-3}$

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$$D_f = \{(x, y) \in \mathbb{R}^2 \mid (x+y-3) \geq 0\}$$

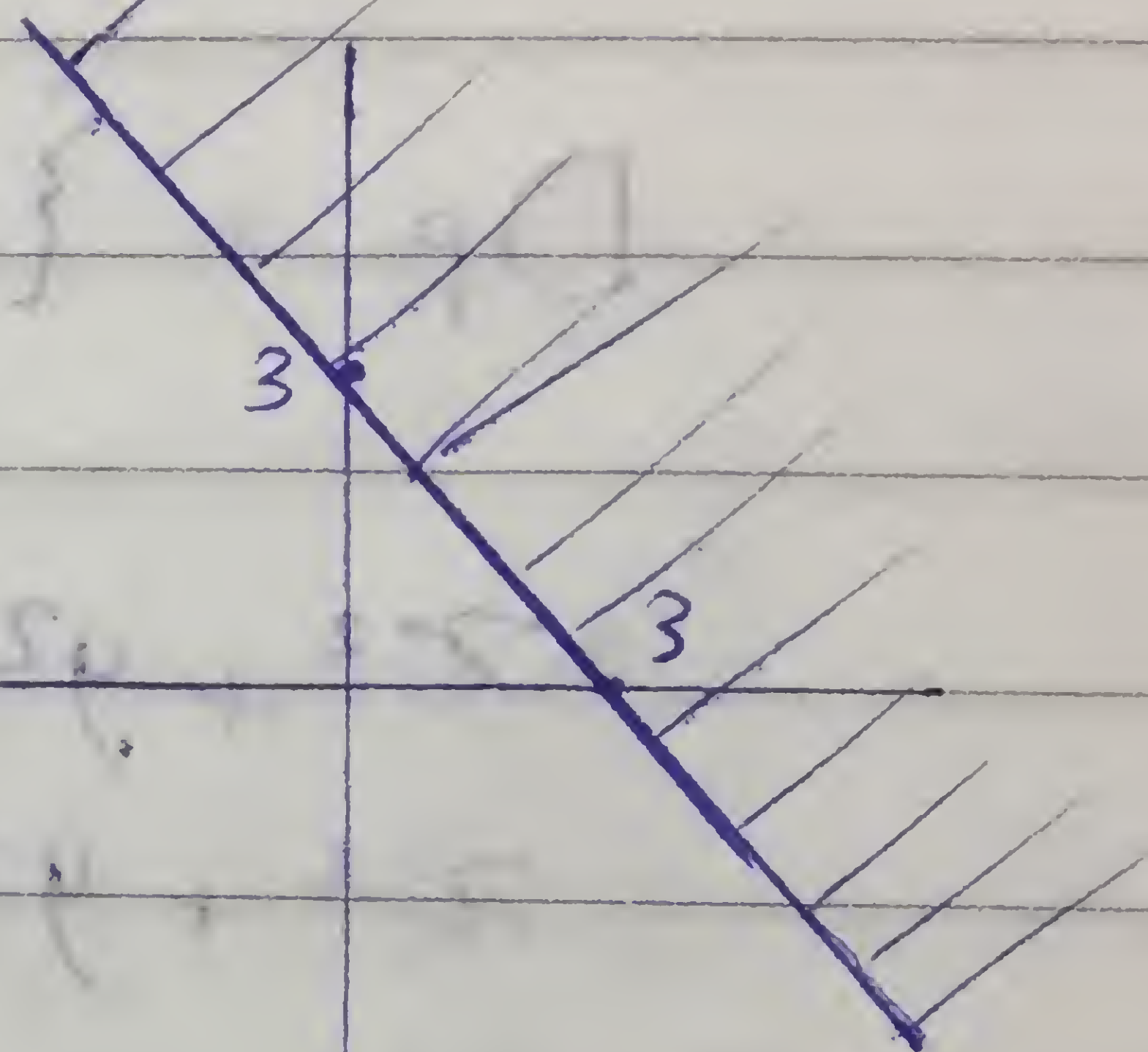
$$x+y-3=0$$

$$x+y=3$$

نقطة أو نقطة

Let $x=0, y=0$

$$y=3 \quad x=3$$



4) $f(x, y) = \sqrt{9-x^2-y^2}$

$$D_f = \{(x, y) \in \mathbb{R}^2 \mid (9-x^2-y^2) \geq 0\}$$

$$9-x^2-y^2=0$$

$$x^2+y^2=9=3^2$$

at $(3, 0)$

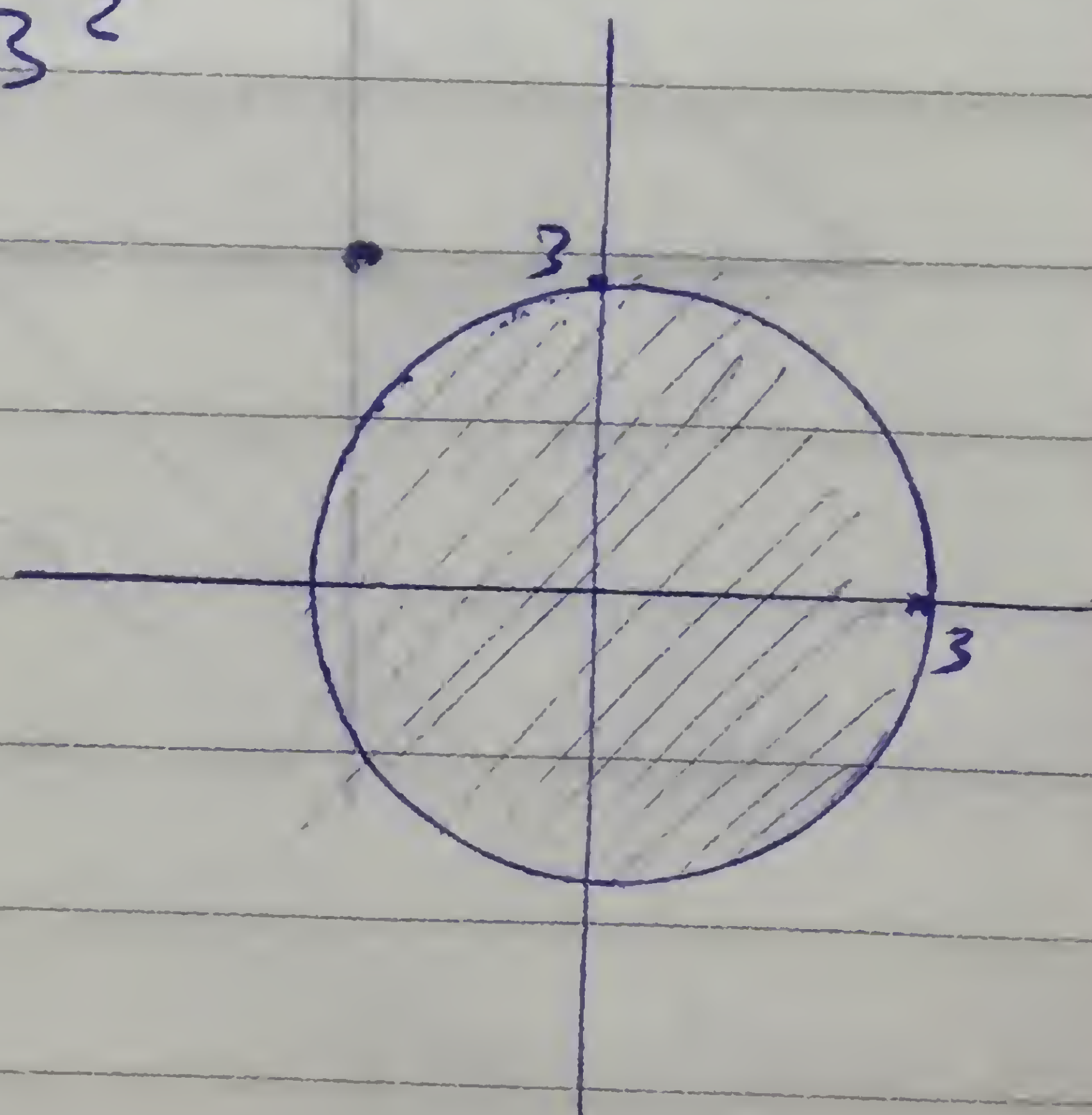
$$f(x, y) \in$$

at $(0, 0)$

$$f(x, y) = \infty$$

at $(10, 10)$

$$f(x, y) \notin$$



$$f(x, y) = \sqrt{0} = 0$$

at $(3, 0)$

$$f(x, y) = \sqrt{0} = 0$$

نقطة أو نقطة

نقطة أو نقطة

نقطة أو نقطة

at $(0, 0)$

$$f(x, y) \notin$$

at $(4, 0)$

$$f(x, y) \in$$

$$⑤ \quad f(x, y) = \frac{1}{\sqrt{y - \sqrt{x}}}$$

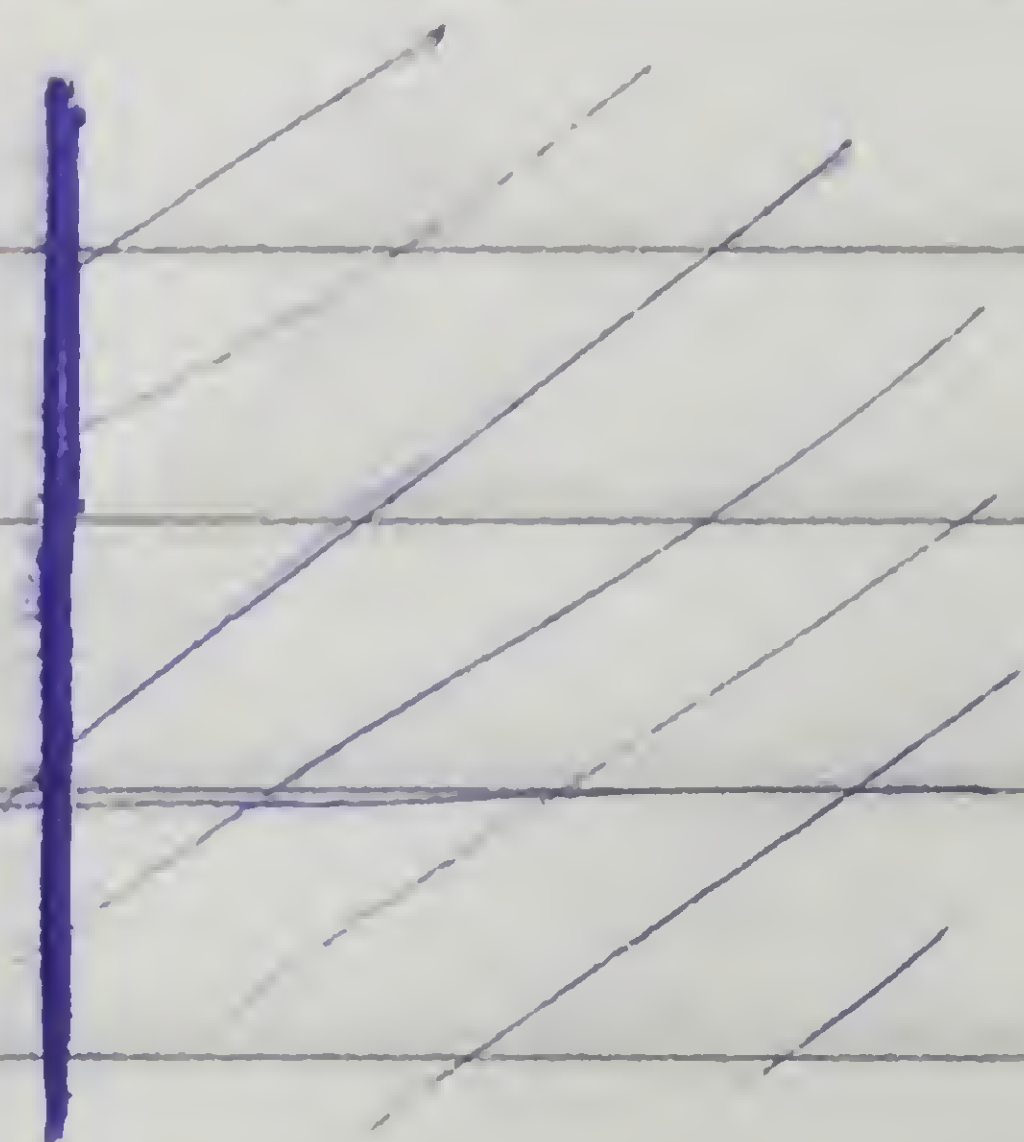
بمقادير مع \sqrt{x} موجب

المقام

$$x < 0$$

$$y - \sqrt{x} \leq 0$$

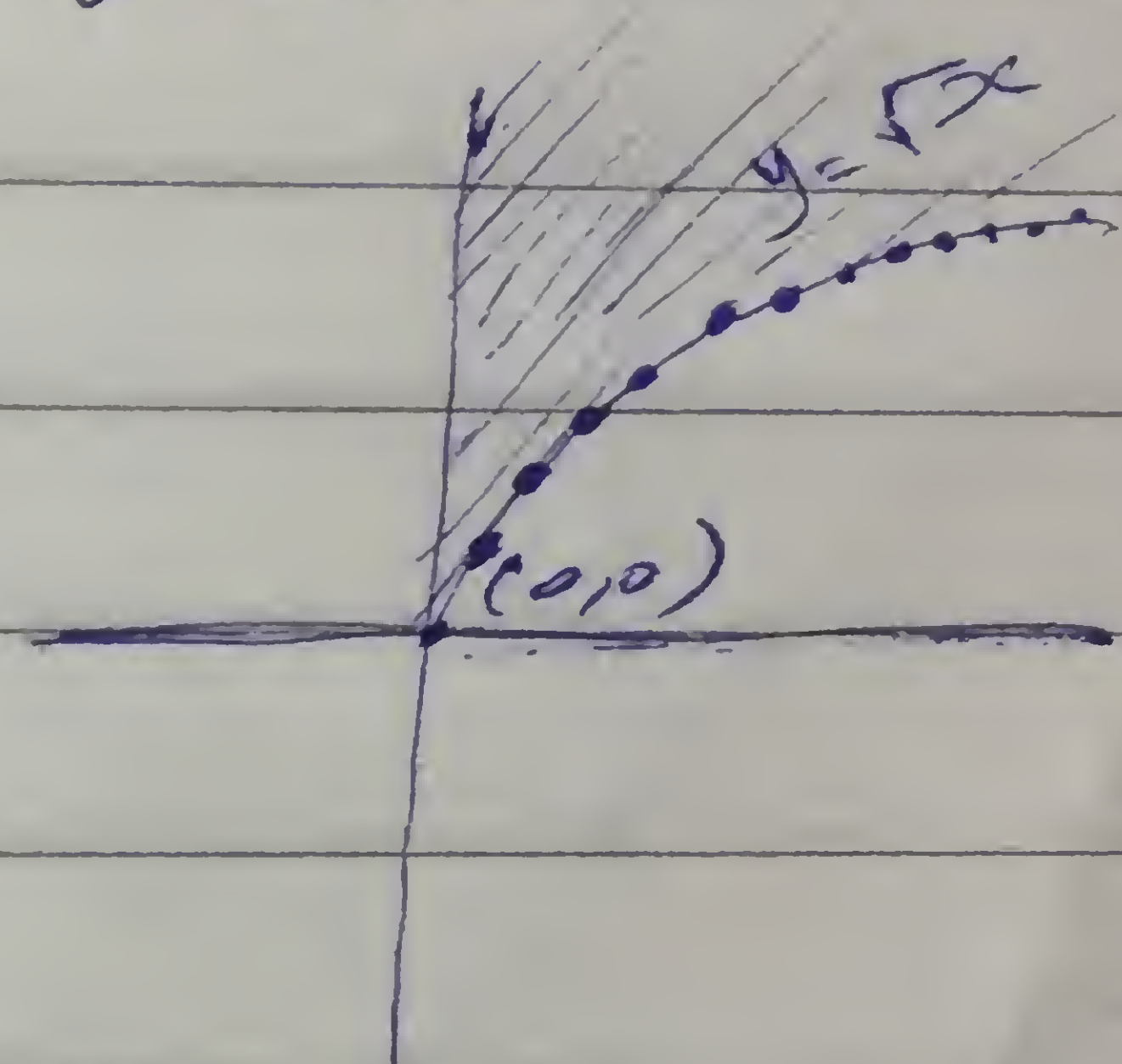
$$x = 0$$



$$y - \sqrt{x} = 0$$

$$y = \sqrt{x}$$

$$y^2 = x$$



$$\text{at } (0, 1) \in$$

$$f(x, y) \in$$

$$\sqrt{1-0} \in$$

$$\text{at } (2, 0)$$

$$f(x, y) \notin$$

$$\text{at } (2, 2)$$

$$f(x, y) \in$$

$$\text{at } (2, -2)$$

$$f(x, y) \notin$$

$$\text{at } (-2, 2)$$

$$f(x, y) \notin$$

$$\text{at } (-2, -2)$$

$$f(x, y) \notin$$

$$\text{at } (0, 0)$$

$$f(x, y) = \frac{1}{0} \notin$$

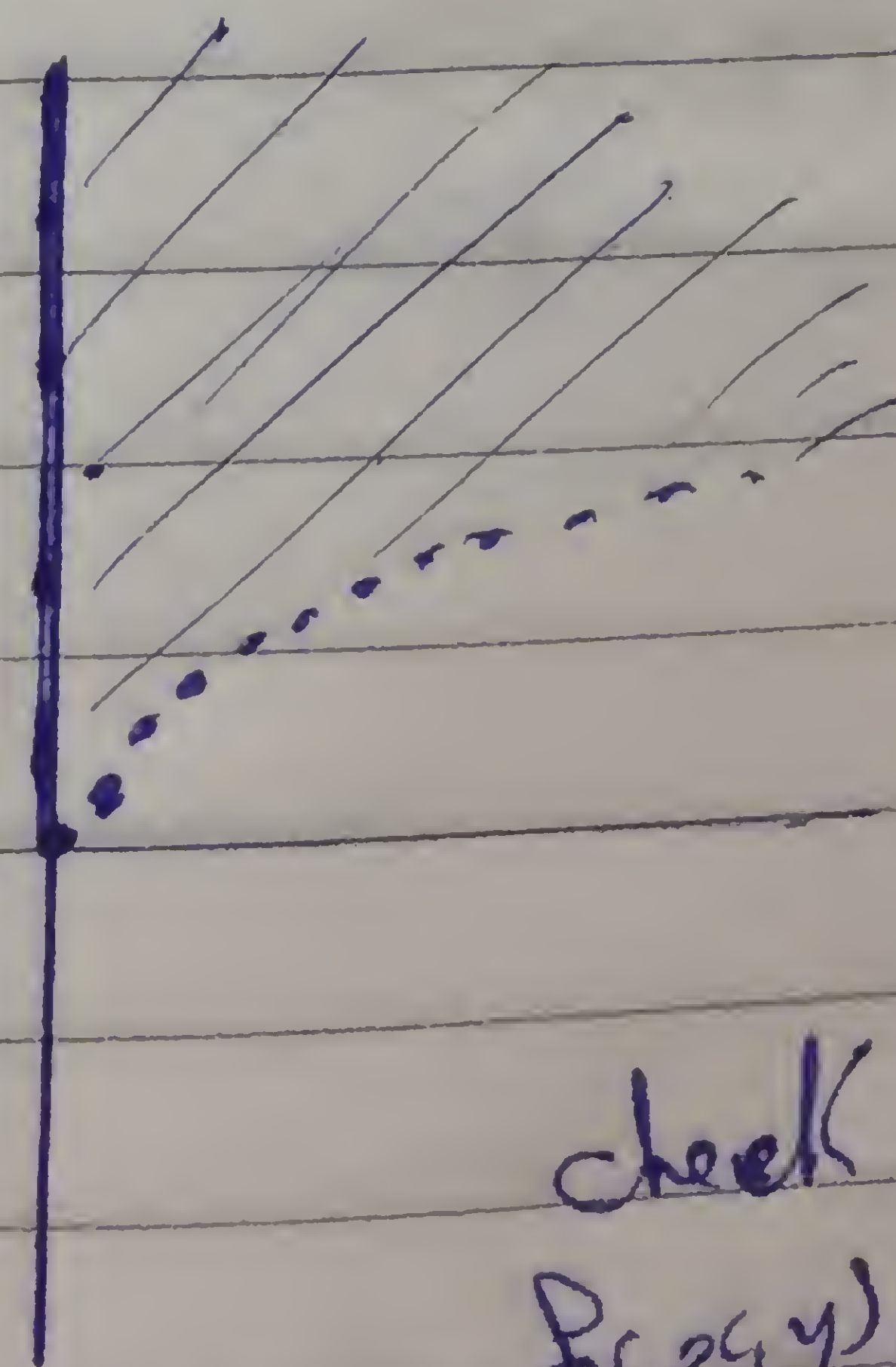
ليس

$$\text{at } (1, 0)$$

$$f(x, y) \notin$$

$$\text{at } (0, 1)$$

$$f(x, y) \in$$



check
بالنسبة لـ $f(x, y)$

$$D_f = \{(x, y) \in \mathbb{R}^2 : (x < 0), (y - \sqrt{x} \leq 0)\}$$

⑥ $f(x, y) = \sin^{-1}(x+y)$

$$D_f = \{ (x, y) : -1 \leq x+y \leq 1 \}$$

المسوح

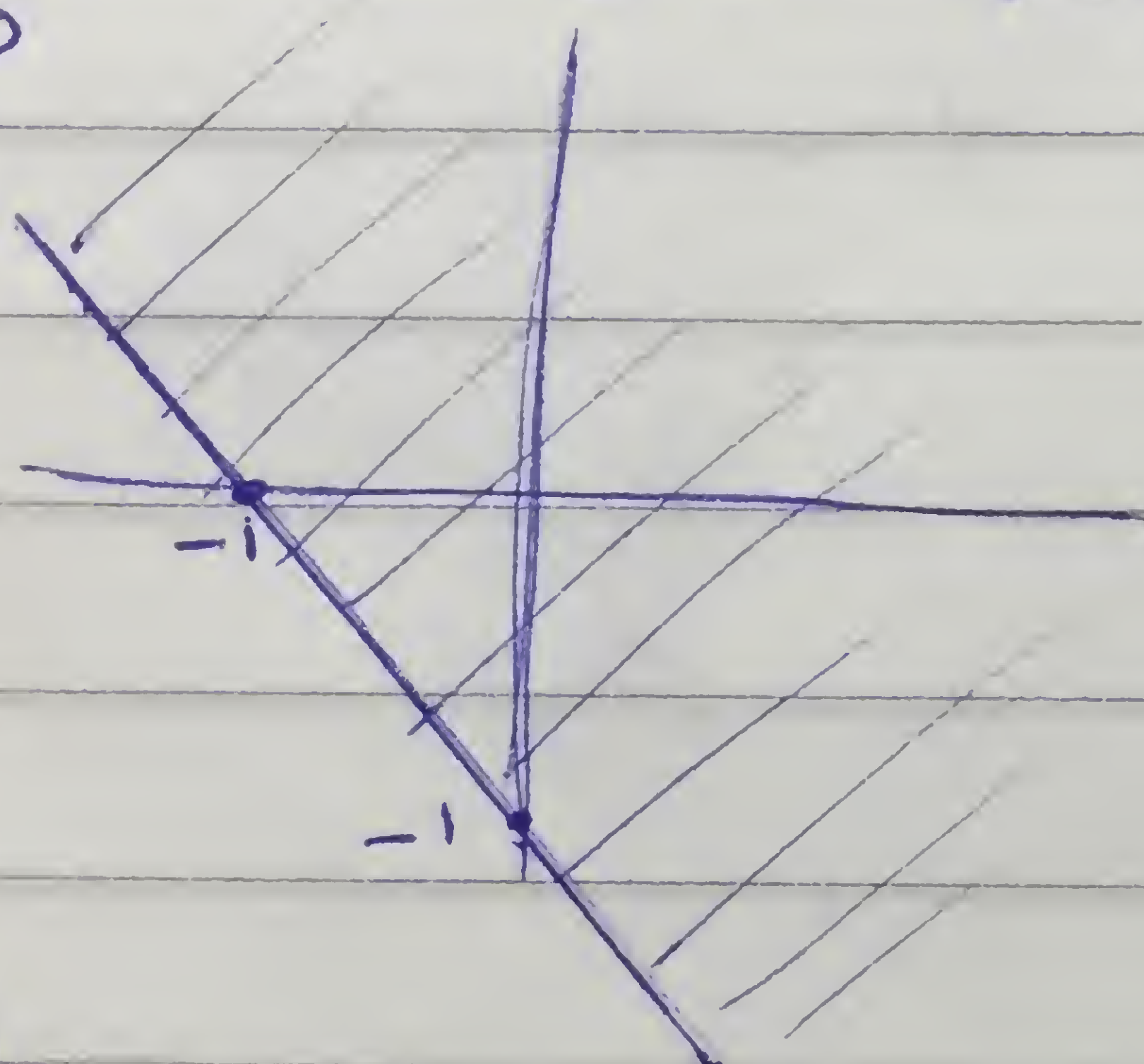
$$x+y \geq -1$$

$$x+y \leq 1$$

نقوس
نقوس

$$x+y = -1$$

لرسم



at $(-1, 0)$

in the line

$$x+y > -1 \in$$

at $(0, 0)$

$$x+y > -1$$

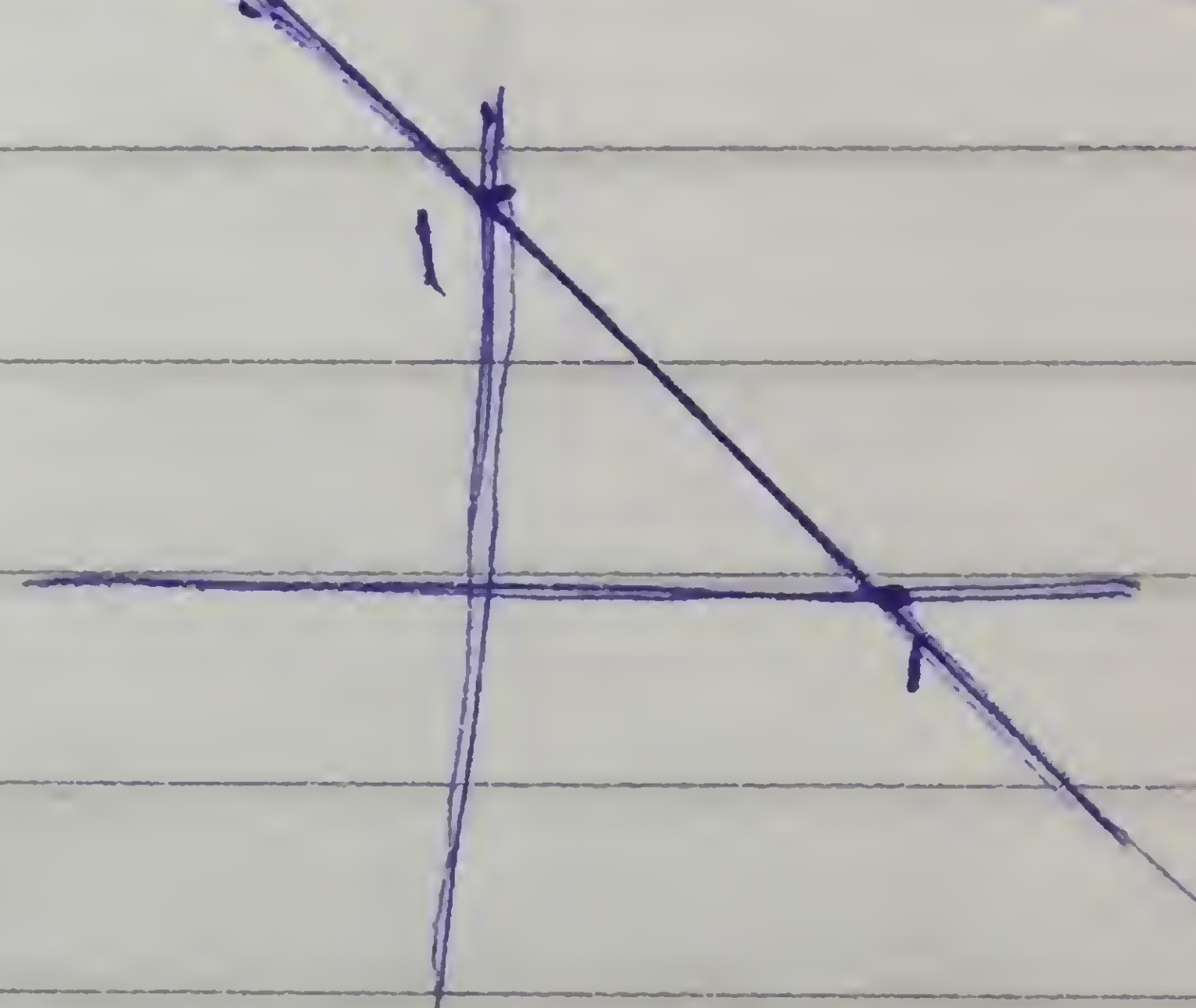
$$0+0 > -1 \in$$

at $(-2, 0)$

$$x+y > -1 \notin$$

$$x+y = 1$$

لرسم



at $(0, 1)$

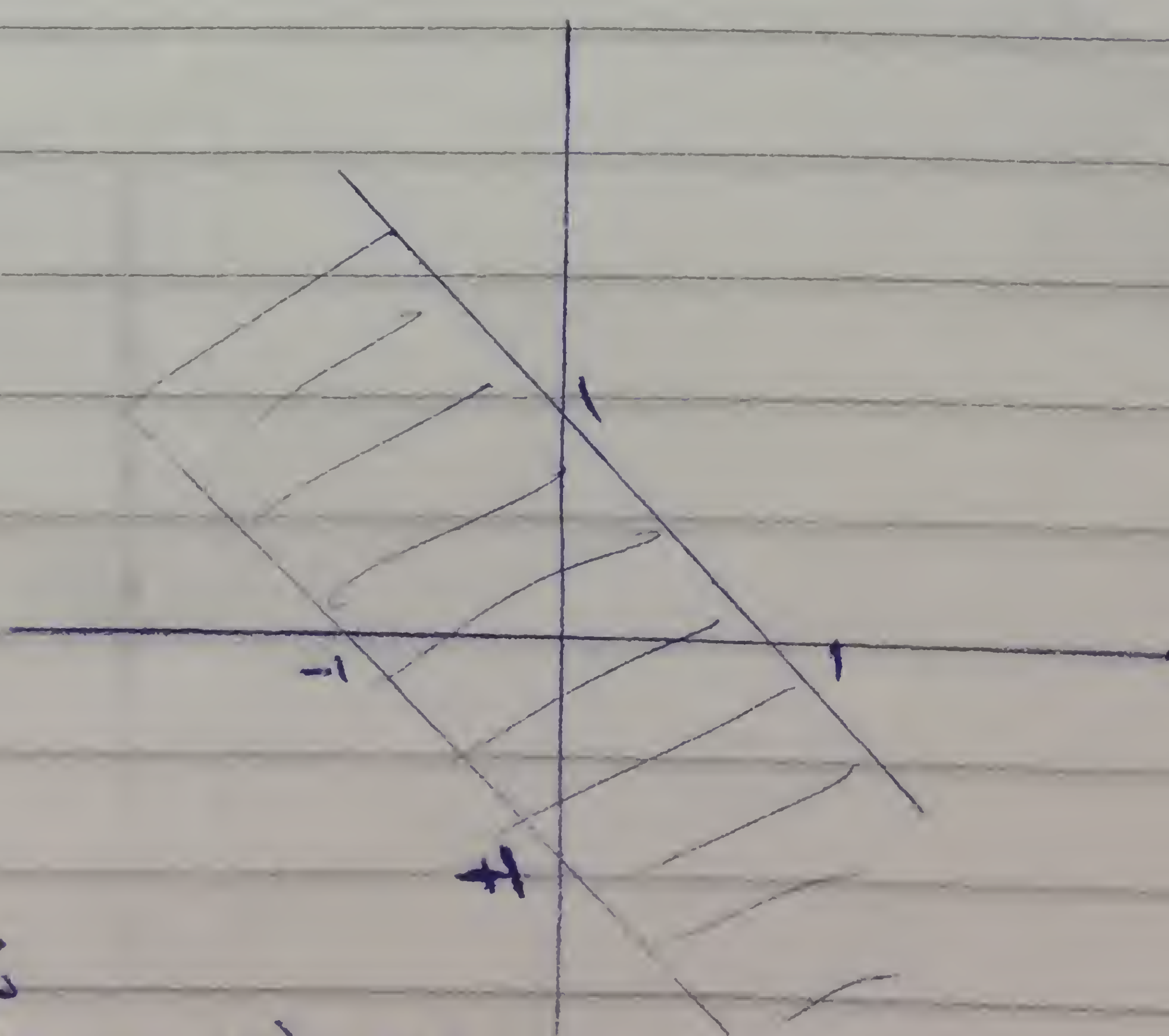
$$x+y \leq 1 \in$$

at $(0, 0)$

$$x+y \leq 1 \in$$

at $(2, 2)$

$$x+y \leq 1 \notin$$



at $(0, 0)$ checks in $f(x, y) \in$